



## Huntington Power Plant

6 miles west of Huntington, Utah on Hwy. 31  
P.O. Box 680  
Huntington, Utah 84528

December 21, 2017

Mr. Bryce Bird, Director  
Utah Department of Environmental Quality  
Division of Air Quality  
195 North 1950 West  
P.O. Box 144820  
Salt Lake City, UT 84114-4820

**RE: 4th Quarter, 2017 Particulate Matter Compliance Test Report - 40 CFR 63 SubPart UUUU,  
Huntington Power Plant Unit 1 and Unit 2 (Title V Permit #1501001004)**

Dear Mr. Bird,

In accordance with Title V Permit Condition II.B.3.f.1(b) and 40 CFR §63.10021(d) the Huntington Power Plant submits the 4th Quarter 2017 Particulate Matter (PM) Compliance Test Reports for Unit 1 and for Unit 2.

This submittal is intended to satisfy the report submittals for both units, and includes the portable document format (PDF) report that is submitted electronically via the Emissions Collection and Monitoring Plan System (ECMPS).

The summary results of the 4th Quarter 2017 PM test results are:

Unit	Emission rate (lb/mmBtu)
1	0.011
2	0.005

I am authorized to make this submission on behalf of the owners and operators of the affected source or affected units for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information, or omitting statements and information, including the possibility of fine or imprisonment.

Should you have any questions regarding this information, please contact Richard Neilson, Huntington Power Plant Environmental Engineer at (435) 687-4334 or me at (435) 687-4211.

Sincerely,

Darrell Cunningham  
Managing Director and Responsible Official, Huntington Plant

Enclosures: "Emissions Testing Report for PacifiCorp Huntington Unit 1 – Particulate Matter Compliance Testing"  
"Emissions Testing Report for PacifiCorp Huntington Unit 2 – Particulate Matter Compliance Testing"

cc: David Barnhisel  
Steve Jensen  
Sara Loiacono, USEPA Region VIII, w/enclosures, by electronic communication



Emissions Testing Report for PacifiCorp  
Huntington Unit 2  
Huntington, Utah

Particulate Matter Compliance Testing

40 CFR Part 63, Subpart UUUUU

Test Date: December 6, 2017

Project Code PC17-0001.20

## **Executive Summary**

EMCo was contracted by PacifiCorp to conduct compliance testing at the Huntington Power Plant near Huntington, Utah. Testing was performed to determine emission rates of particulate matter (PM) from the exhaust stack of Huntington Unit 2. Compliance test results are summarized in the table below; detailed test results are given in the following report.

<b>PacifiCorp</b> <b>Huntington Power Plant</b> <b>PM Compliance Test Results Summary</b>						
<b>Source</b>	<b>Parameter</b>	<b>Date</b>	<b>Average Value</b>	<b>Emission Limit</b>		
Huntington Unit 2	Filterable Particulate Matter	12/6/2017	0.005	0.030 lb/mmBtu		
			0.05	0.30 lb/MW-hr		
Each result is the average of three two-hour test runs.						
<b>Abbreviations:</b> lb/mmBtu: pounds per million British thermal units lb/MW-hr: pounds per megawatt hour						

## **Introduction**

EMCo was contracted by PacifiCorp to conduct source testing services at the Huntington Power Plant near Huntington, Utah. The Huntington Plant comprises two pulverized coal-fired boilers. Huntington Unit #2 is equipped with low-NO<sub>x</sub> burners and overfire air for NO<sub>x</sub> control, an FGD scrubber for SO<sub>2</sub> control and pulse-jet fabric filters for PM control. Testing was conducted in accordance with the requirements of 40 CFR Part 63 Subpart UUUUU, National Emission Standards for Hazardous Air Pollutants (NESHAP): Coal- and Oil-Fired Electric Utility Steam Generating Units.

Contact information for the project is listed in the table below.

Contact	Affiliation	Telephone	E-mail
Frank Zampedri Environmental Analyst	PacifiCorp	(801) 220-2169	frank.zampedri@pacificorp.com
Richard Neilson Environmental Engineer		(435) 687-4334	richard.neilson@pacificorp.com
Rob Leishman Environmental Scientist	UDEQ	(801) 536-4063	rleishman@utah.gov
Andrew Bruning Client Project Manager	EMCo	(303) 495-3936	abruning@montrose-env.com

## **Scope of Work**

Testing was performed to determine concentrations and mass emission rates of particulate matter (PM) for comparison to the applicable emission limits listed in the table below.

Source	Regulation	Parameter	Emission Limit
Huntington Unit 2	NESHAP UUUUU	PM (lb/mmBtu)	0.030 lb/mmBtu
		PM (lb/MW-hr)	0.30 lb/MW-hr
<b>Abbreviations:</b> lb/mmBtu: pounds per million British thermal units lb/MW-hr: pounds per megawatt-hour			

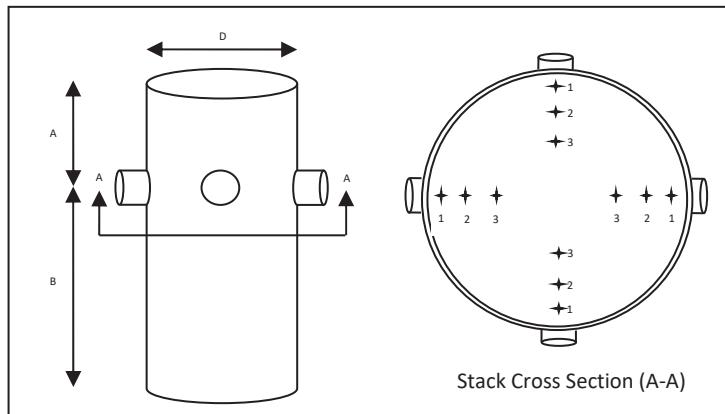
## **Testing Methods**

EMCo used the following EPA Reference Methods for the testing program. No deviations from the Reference Methods were noted.

Parameter	EPA Reference Methods	Test Runs/Duration	Target Sample Volume
PM (lb/mmBtu)	1, 2, 3B, 4, 5*, 19	3 @ 2 hr	2 dscm (70.63 dscf)**
*In accordance with Table 5 of NESHAP Subpart UUUUU, the front-half temperature was set at 320° ± 25°F.			
**Sample volume from Table 2 of NESHAP Subpart UUUUU, doubled in accordance with §63.10005.			

## **Testing Location**

The Huntington Unit 2 exhaust sampling location consists of a vertical, circular stack with four orthogonal sampling ports located at least six diameters downstream and two diameters upstream of the nearest flow disturbances. PM testing was performed across a grid of 12 points determined using EPA Method 1. See the schematic below.



Huntington Test Diagram	
Unit #	2
Diameter (D)	322.7"
Upstream Distance (A)	>220'
Downstream Distance (B)	>266'
<b>Sample Point Distances from Stack Wall</b>	
Traverse Point 1	14.1"
Traverse Point 2	47.3"
Traverse Point 3	95.5"

## **Test Results**

The results of the testing program are given in the tables below. Detailed test results are located in Appendix A, along with sample calculations for all computed values.

PacificCorp Huntington Unit 2 PM Compliance Test Results Summary (12/6/2017)						
Parameter	Run #1	Run #2	Run #3	Average	QA Specification	Emission Limit***
Start Time	7:20	10:10	12:52	—	—	—
Stop Time	9:33	12:25	15:05	—	—	—
Sample Gas Volume (dscf)	76.04	74.00	73.59	<b>74.54</b>	<b>&gt;70.63*</b>	—
Isokinetic Variation (%)	103.5	100.0	100.1	<b>101.2</b>	<b>100 ± 10%</b>	—
Filterable PM (lb/mmBtu)	0.002	0.008	0.004	<b>0.005</b>	—	<b>0.030</b>
Boiler Load (MW)	472	475	471	<b>473</b>	<b>&gt;459**</b>	—
Filterable PM (lb/MW-hr)	0.02	0.08	0.04	<b>0.05</b>	—	<b>0.30</b>

\* Sample volume from Table 2 of NESHAP Subpart UUUUUU, doubled in accordance with §63.10005.  
\*\*90% of design capacity, in accordance with §63.10007(a)(2).  
\*\*\*As shown, average PM emissions were less than 50% of the applicable emission limit, qualifying the unit for Low Emitting EGU (LEE) status.

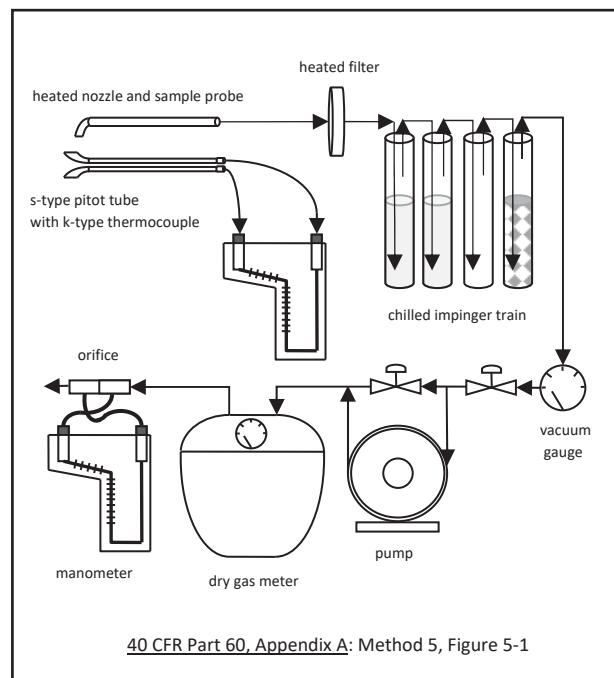
## **Testing Equipment**

All testing equipment was housed in a climate-controlled mobile analytical laboratory designed and built by EMCo. All required quality assurance tests were performed as required by the applicable Reference Methods. Detailed equipment descriptions are given in the table below.

Parameter	Equipment	EPA Reference Method(s)
Particulate Matter (PM)	Heated probe with glass nozzle and stainless steel probe liner Quartz fiber filter S-type pitot tube K-type thermocouple Inclined-vertical manometer Dry gas meter Digital scale Analytical balance	1, 2, 3B, 4, 5, 19

## **Test Details**

Particulate matter testing was performed using EPA Methods 1, 2, 3B, 4 and 5. Each test run was 120 minutes in duration. Sampling was performed along a grid of points determined using EPA Method 1. Exhaust gas flow measurements were taken using an S-type pitot tube, K-type thermocouple and inclined-vertical manometer in accordance with EPA Method 2. A sample of exhaust gas was withdrawn from the stack at an isokinetic flow rate through a heated stainless steel nozzle and probe, through a heated quartz-fiber filter, through four chilled glass impingers containing known masses of water or silica gel, and through a dry gas meter. (See Figure 5-1 at right.) The default dry molecular weight for combustion sources (30 lbs/lb-mole) listed in EPA Method 3 was combined with pressure and temperature measurements to calculate stack gas velocity in accordance with EPA Method 2. Stack gas moisture concentrations were determined gravimetrically in accordance with EPA Method 4. Following each sampling period, the filter and rinses of the nozzle and probe were recovered and returned to EMCo's laboratory for gravimetric analysis. Following analysis, the particulate mass captured during each test run was combined with concurrent flow and moisture data to calculate particulate matter emissions in units of pounds per hour (lb/hr). The particulate mass captured during each test run was combined with concurrent CO<sub>2</sub> concentration data from the plant CEMS<sup>1</sup> and the appropriate fuel F-factor from EPA Method 19 (1,800 scf/mmBtu) to calculate PM emissions in units of pounds per million British thermal units (lb/mmBtu) for comparison to the applicable emission limit.



<sup>1</sup> EPA Method 3B §6.0 states "As an alternative to the sampling apparatus and systems described herein, other sampling systems may be used, provided such systems are ... capable of yielding acceptable results." As NESHAP UUUUUU requires certified Part 75 CEMS CO<sub>2</sub> data to calculate SO<sub>2</sub> and mercury emissions in units of lb/mmBtu, CEMS CO<sub>2</sub> data are considered acceptable for PM emission calculations as well.

## **Appended Information**

Supporting data for this testing program are included as follows.

### **Appendix A: Test Summary**

- Data Reduction Spreadsheet
- Sample Calculations

### **Appendix B: Field Data**

- Field Datasheets

### **Appendix C: Laboratory Data**

- Gravimetric Analysis

### **Appendix D: CEMS Data**

- Test Run CEMS Printouts

### **Appendix E: Calibration Information**

- Dry Gas Meter Pre-Test and Post-Test Calibrations
- Critical Orifice Calibration Certificate
- AETB Certification



**Project PC17-0001**

**Appendix A: Test Summary**

Data Reduction Spreadsheets

Sample Calculations

PC17-1.20  
 PacifiCorp  
 Huntington Unit 2  
 12/6/2017

	Run #	1	2	3	
Θ	Start Time	7:20	10:10	12:52	
	Stop Time	9:33	12:25	15:05	
	Sample Time (min.)	120	120	120	
EPA Method 2 Data		1	2	3	Average
<b>Inputs</b>					
D <sub>s</sub>	Stack Diameter (inches)	322.7	322.7	322.7	<b>322.7</b>
P <sub>bar</sub>	Barometric Pressure ("Hg)	23.74	23.74	23.74	<b>23.7</b>
P <sub>g</sub>	Stack Static Pressure ("H <sub>2</sub> O)	-3.0	-3.0	-3.0	<b>-3.0</b>
C <sub>p</sub>	Pitot Tube Coefficient (unitless)	0.84	0.84	0.84	<b>0.84</b>
VΔp <sub>avg</sub>	Avg. Velocity Head of Stack Gas v("H <sub>2</sub> O)	0.8085	0.8069	0.813	<b>0.8095</b>
T <sub>s</sub>	Stack Gas Temperature (°F)	112	113	114	<b>113</b>
<b>Calculations</b>					
A	Stack Area (ft <sup>2</sup> )	567.970	567.970	567.970	<b>567.970</b>
P <sub>g</sub>	Stack Static Pressure ("Hg)	-0.22	-0.22	-0.22	<b>-0.22</b>
M <sub>d</sub>	Stack Gas Molecular Weight, dry basis (lb/lb-mole)	30.00	30.00	30.00	<b>30.00</b>
M <sub>s</sub>	Stack Gas Molecular Weight, wet basis (lb/lb-mole)	28.66	28.80	28.62	<b>28.69</b>
P <sub>s</sub>	Absolute Stack Pressure ("Hg)	23.52	23.52	23.52	<b>23.52</b>
T <sub>s(abs)</sub>	Absolute Stack Gas Temperature (°R)	572	573	574	<b>573</b>
V <sub>s</sub>	Stack Gas Velocity (ft/sec)	53.5	53.3	53.9	<b>53.6</b>
Q	Stack Gas Dry Volumetric Flow Rate (dscf/hr)	70,509,136	71,019,721	70,559,082	<b>70,695,980</b>
Q	Stack Gas Dry Volumetric Flow Rate (dscf/min)	1,175,152	1,183,662	1,175,985	<b>1,178,266</b>
CEMS Diluent Data		1	2	3	Average
<b>Inputs</b>					
CO <sub>2</sub> (%vvw)		11.0	10.9	11.0	<b>11.0</b>
CO <sub>2</sub> (%vvd)		12.4	12.1	12.4	<b>12.3</b>
EPA Method 4 Data		1	2	3	Average
<b>Inputs</b>					
V <sub>lc</sub>	Volume of Water Condensed (mL)	202.5	175.3	202.7	<b>193.5</b>
V <sub>m</sub>	Volume of Stack Gas Collected (dcf)	94.135	92.851	93.045	<b>93.344</b>
Y	Meter Calibration Factor (unitless)	0.9939	0.9939	0.9939	<b>0.9939</b>
ΔH	Pressure Differential Across Orifice ("H <sub>2</sub> O)	1.7	1.7	1.7	<b>1.7</b>
T <sub>m</sub>	Temperature at Gas Meter (°F)	58	65	69	<b>64</b>
<b>Calculations</b>					
P <sub>m</sub>	Absolute Pressure at Gas Meter ("Hg)	23.87	23.87	23.87	<b>23.87</b>
T <sub>m</sub>	Absolute Temperature at Gas Meter (°R)	518	525	529	<b>524.0</b>
V <sub>wc(std)</sub>	Volume of Water Condensed (scf)	9.53	8.25	9.54	<b>9.11</b>
V <sub>m(std)</sub>	Sample Gas Volume (dscf)	76.04	74.00	73.59	<b>74.54</b>
B <sub>ws act</sub>	Observed Stack Gas Moisture Content (%/100)	0.111	0.100	0.115	<b>0.109</b>
B <sub>ws sat</sub>	Saturated Moisture Content (%/100)	0.117	0.120	0.124	<b>0.120</b>
B <sub>ws</sub>	Moisture Content Used (%/100)	0.111	0.100	0.115	<b>0.109</b>
EPA Method 5 Data		1	2	3	Average
<b>Inputs</b>					
D <sub>n</sub>	Nozzle diameter (")	0.233	0.233	0.233	<b>0.233</b>
C1	Mass of PM collected on filter (mg)	1.9	6.2	5.6	<b>4.6</b>
C2	Mass of PM collected in rinses (mg)	2.0	11.7	4.0	<b>5.9</b>
W <sub>a</sub>	Mass of acetone blank (mg)	0.0	0.0	0.0	<b>0.0</b>
<b>Emission Calculations</b>					
F <sub>c</sub>	Fuel F-Factor (scf/mmBtu)	1800	1800	1800	<b>1800</b>
A <sub>n</sub>	Cross-sectional area of nozzle (ft <sup>2</sup> )	2.96E-04	2.96E-04	2.96E-04	<b>2.96E-04</b>
I	Isokinetic variation (%)	103.5	100.0	100.1	<b>101.2</b>
m <sub>n</sub>	Total Filterable PM mass less blank (mg)	3.9	17.9	9.6	<b>10.5</b>
C <sub>s</sub>	Filterable Particulate concentration (gr/dscf)	0.001	0.004	0.002	<b>0.002</b>
C <sub>s</sub>	Filterable Particulate concentration (lb/dscf)	1.13E-07	5.33E-07	2.88E-07	<b>3.11E-07</b>
E <sub>lb/hr</sub>	Filterable Particulate mass emission rate (lb/hr)	8	38	20	<b>22</b>
	Boiler Load (MW)	472	475	471	<b>473</b>
	Filterable Particulate mass emission rate (lb/MW-hr)	0.02	0.08	0.04	<b>0.05</b>
F <sub>c</sub>	Filterable Particulate mass emission rate (lb/mmBtu)	0.002	0.008	0.004	<b>0.005</b>
8760 hrs/yr	Filterable Particulate mass emission rate (tons/year)	35	166	89	<b>97</b>

EPA Method 5: Determination of Particulate Matter Emissions (40 CFR Part 60, Appendix A-1)

Variables

Variable	Value	Definition	Unit of Measurement
D <sub>s</sub>	322.7	Stack Diameter	inches
A	567.97	Cross-Sectional Area of the Stack	ft <sup>2</sup>
P <sub>g</sub>	-3.00	Stack Static Pressure	in. H <sub>2</sub> O
P <sub>g</sub>	-0.22	Stack Static Pressure	in. Hg
%CO <sub>2</sub>	12.4	Concentration of Carbon Dioxide	Dry Volume Percent (%vd)
%O <sub>2</sub>	n/a	Concentration of Oxygen	Dry Volume Percent (%vd)
M <sub>d</sub>	30.00	Dry Molecular Weight of the Stack Gas (default)	lb/lb-mole
P <sub>bar</sub>	23.74	Barometric Pressure	in. Hg
ΔH	1.70	Pressure Differential across Orifice	in. H <sub>2</sub> O
P <sub>m</sub>	23.87	Absolute Pressure at Gas Meter	in.Hg
t <sub>m</sub>	58	Temperature at Gas Meter	°F
T <sub>m</sub>	518	Absolute Temperature at Gas Meter	°R
K1	0.04706	Conversion Factor	ft <sup>3</sup> /mL
V <sub>lc</sub>	202.5	Volume of Water Condensed	g
V <sub>wc(std)</sub>	9.53	Volume of Water Condensed	scf
K <sub>4</sub>	17.64	Constant	°R/in.Hg
Y	0.9939	Meter Calibration Factor	Unitless
V <sub>m</sub>	94.135	Volume of Stack Gas Collected	dcf
V <sub>m(std)</sub>	76.037	Sample Gas Volume	dscf
B <sub>ws</sub>	0.111	Stack Gas Moisture Content	%/100
M <sub>s</sub>	28.66	Actual Molecular Weight of the Stack Gas	lb/lb-mole
P <sub>s</sub>	23.52	Absolute Stack Pressure	in. Hg
T <sub>s</sub>	112	Average Stack Temperature	°F
T <sub>s(abs)</sub>	572	Average Absolute Stack Temperature	°R
K <sub>p</sub>	85.49	Conversion Factor	(ft/sec) x V(((lb/lb-mole)(in.Hg))/((°R)(in.H <sub>2</sub> O)))
C <sub>p</sub>	0.84	Pitot Coefficient	Dimensionless
AvgVΔp	0.8085	Average Square Root of Velocity Head Readings	in. H <sub>2</sub> O
V <sub>s</sub>	53.48	Average Stack Gas Velocity	ft/sec
T <sub>std</sub>	528	Standard Absolute Temperature	°R
P <sub>std</sub>	29.92	Standard Absolute Pressure	in. Hg
Q	70,509,136	Dry Volumetric Flow Rate Corrected to Standard Conditions	dscf/hr
D <sub>n</sub>	0.233	Nozzle Diameter	inches
A <sub>n</sub>	2.96E-04	Cross-Sectional Area of the Nozzle	ft <sup>2</sup>
m <sub>n</sub>	3.90	Total PM Mass	mg
C <sub>s</sub>	1.13E-07	Particulate Concentration	lb/dscf
E <sub>lb/hr</sub>	8.0	PM Mass Emission Rate	pounds per hour
F <sub>c</sub>	1800	F-Factor from EPA Method 19	scf/mmBtu
E <sub>lb/mmBtu</sub>	0.002	PM Mass Emission Rate	pounds per million Btu
E <sub>tons/yr</sub>	34.9	PM Mass Emission Rate	tons per year
K5	0.0945	Constant	(in.Hg · min) / ((°R · sec))
Θ	120	Sample Time	minutes
I	103.5 %	Isokinetic variation	percent

**PC17-1.20**  
**PaciFiCorp**  
**Huntington Unit 2**  
**Run #1 Sample Calculations**

**EPA Method 5: Determination of Particulate Matter Emissions (40 CFR Part 60, Appendix A-1)**

$$A = \pi(D_s/24)^2$$

$$\pi(322.7/24)^2$$

$$= 567.97 \text{ ft}^2$$

$$P_g = P_{bar}/13.6$$

$$= -3/13.6$$

$$= -0.22 \text{ in. Hg}$$

$$M_d = 30.00 \text{ lb/lb-mole}$$

$$P_m = P_{bar} + (\Delta H/13.6)$$

$$= 23.74 + (1.7/13.6)$$

$$= 23.87 \text{ in. Hg}$$

$$T_m = 460 + t_m$$

$$= 460 + 58$$

$$= 518 \text{ R}$$

$$V_{wc(std)} = K_1 \times V_{lc}$$

$$= 0.04706 \times 202.5$$

$$= 9.53 \text{ scf} \quad (Eq. 4-1)$$

$$V_{m(std)} = \frac{K_4 \times Y \times V_m \times P_m}{T_m}$$

$$= \frac{17.64 \times 0.9939 \times 94.135 \times 23.87}{518}$$

$$= 76.04 \text{ dscf} \quad (Eq. 4-3)$$

$$B_{ws} = \frac{V_{wc(std)}}{V_{wc(std)} + V_{m(std)}}$$

$$= \frac{9.53}{9.53 + 76.04}$$

$$= 0.111 (\%/100) \quad (Eq. 4-4)$$

$$M_s = M_d \times (1 - B_{ws}) + (18.0 \times B_{ws})$$

$$= 30.00 \times (1 - 0.111) + (18.0 \times 0.111)$$

$$= 28.66 \text{ lb/lb-mole} \quad (Eq. 2-6)$$

$$P_s = P_{bar} + P_g$$

$$= 23.74 + (-0.22)$$

$$= 23.52 \text{ in. Hg}$$

$$T_{s(abs)} = 460 + T_s$$

$$= 460 + 112$$

$$= 572 \text{ R}$$

**PC17-1.20**  
**PaciFiCorp**  
**Huntington Unit 2**  
**Run #1 Sample Calculations**

EPA Method 5: Determination of Particulate Matter Emissions (40 CFR Part 60, Appendix A-1)

$$V_s = K_p \times C_p \times Avgv/\Delta p \times \sqrt{\frac{T_{s(abs)}}{(P_s \times M_s)}}$$

$$= 85.49 \times 0.84 \times 0.8085 \times \sqrt{\frac{572}{(23.52 \times 28.66)}}$$

$$= 53.5 \text{ ft/sec}$$

(Eq. 2-7)

$$Q = 3600 \times (1 - B_{ws}) \times (V_s) \times (A) \times \frac{(T_{std} \times P_s)}{(T_{s(abs)} \times P_{std})}$$

$$= 3600 \times (1 - 0.111) \times (53.48) \times (567.97) \times \frac{(528 \times 23.52)}{(572 \times 29.92)}$$

$$= 70,509,136 \text{ dscf/hr}$$

(Eq. 2-8)

$$A_n = \pi(D_n/24)^2$$

$$\pi(0.233/24)^2$$

$$= 2.96E-04 \text{ ft}^2$$

$$C_s = \frac{m_n}{(mg/g) (g/lb) (V_{m(std)})}$$

$$= \frac{3.9}{(1000) (453.592) (76.037)}$$

$$= 1.13E-07 \text{ lb/dscf}$$

$$E_{lb/hr} = C_s \times Q$$

$$= 1.13E-07 \times 70509136$$

$$= 8.0 \text{ lb/hr}$$

$$E_{lb/mmBtu} = \frac{C_s \times F_c \times 100}{(CO_2\%vd)}$$

$$= \frac{1.13E-07 \times 1800 \times 100}{(12.4)}$$

$$= 0.002 \text{ lb/mmBtu}$$

$$E_{tons/yr} = \frac{E_{lb/hr} \times (\text{Hrs/yr})}{(\text{lbs/ton})}$$

$$= \frac{7.97 \times 8,760}{2000}$$

$$= 34.9 \text{ tons/year}$$

$$I = \frac{K5 \times T_{s(abs)} \times V_{m(std)} \times 100}{P_{s(abs)} \times V_s \times A_n \times \Theta \times (1 - B_{ws})}$$

$$= \frac{0.0945 \times 572 \times 76.037 \times 100}{23.52 \times 53.48 \times 3.0E-04 \times 120 \times (1 - 0.111)}$$

$$= 103.5 \%$$

(Eq. 5-7)



**Project PC17-0001**  
**Appendix B: Field Data**  
Field Datasheets

# Emissions Measurement Company: Method 5/202 Data Sheet

EMCo Job #:	045AS-284160	Operator(s):	515 AB
Client:	PC HTG	Barometric pressure ("Hg):	23.74
Source:	U2	Static pressure ("H <sub>2</sub> O):	-3.0
Date:	12/6/17	Leak Check ("H <sub>2</sub> O @ Vac):	0.00@15"
Run #	2	Leak Check ("H <sub>2</sub> O @ Vac):	0.00@11"
Meterbox ID:	M5-5	Pitot ID / Coeff:	.84
Meterbox Y =	9939 ΔH@= 1.948	Pitot Leak Check:	✓
O <sub>2</sub> %:	~7	Nozzle Diameter:	.233
CO <sub>2</sub> %:	~12	K Factor:	2.53
Start Time	10:10	Stop Time	12:25

Impinger Weights (x.x g)	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4 (SG)		
Total		
		Total

Traverse	Sample Point	Stack Temp (°F)	Probe Temp (°F)	Filter Temp (°F)	Velocity Δp (H <sub>2</sub> O)	Orifice Pressure ΔH (H <sub>2</sub> O)	Vacuum (Hg)	Sample Volume (ft <sup>3</sup> )	DGM Temp (°F) Inlet	DGM Temp (°F) Outlet	CPM Filter Temp (°F)	Imp. Outlet Temp (°F)
	Point	Time	(°F)	(°F)	(°F)	(H <sub>2</sub> O)	(Hg)					
								461.870				
1	14	113	311	317	.60	1.5	6	469.1	61	59	66	44
2	20	113	318	323	.66	1.7	7	476.9	65	60	66	42
3	30	113	312	321	.73	1.9	8	485.315	67	60	72	44
1	46	113	321	321	.58	1.4	6	492.6	67	61	70	48
2	56	113	320	320	.65	1.7	8	500.1	69	62	69	49
3	60	110	320	320	.70	1.8	8	506.296	70	62	72	49
1	70	114	319	320	.58	1.5	7	575.8	68	62	79	51
2	80	114	315	321	.66	1.7	8	523.6	69	63	73	49
3	9.0	114	319	320	.73	1.9	8	531.802	71	63	74	50
1	100	111	320	320	.58	1.5	7	539.3	70	64	77	53
2	110	111	320	320	.67	1.7	8	547.2	71	64	76	53
3	120	111	319	321	.72	1.8	8	554.721	72	65	77	53
12	120	113	311	317	.8029	1.7	8	92.851	65	72	53	

# Emissions Measurement Company: Method 5/202 Data Sheet

EMCo Job #:	045AS-284160	Operator(s):	(S13) AB
Client:	PC HTG	Barometric pressure ("Hg):	23.74
Source:	U2	Static pressure ("H <sub>2</sub> O):	-3.0
Date:	12/6/17	Leak Check ("H <sub>2</sub> O @ Vac):	0.00@15"
Run #	3	Leak Check ("H <sub>2</sub> O @ Vac):	0.00@11"
Meterbox ID:	M5-5	Pitot ID / Coeff:	-84
Meterbox Y = .9939	ΔH@= 1.948	Pitot Leak Check:	✓
O <sub>2</sub> %:	~7	Nozzle Diameter:	.233
CO <sub>2</sub> %:	~12	K Factor:	2.53
Start Time	1252	Stop Time	1505

Impinger Weights (x x g)	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4 (SG)		
Total		
	Total	

Traverse Point	Sample Time	Stack Temp (°F)	Probe Temp (°F)	Filter Temp (°F)	Velocity Δp (°H <sub>2</sub> O)	Orifice Pressure ΔH (°H <sub>2</sub> O)	Vacuum (inHg)	Sample Volume (ft <sup>3</sup> )	DGM Temp (°F)		CPM Filter Temp (°F)	Imp. Outlet Temp (°F)
									Inlet	Outlet		
								557.598				
1	10	113	314	320	.58	1.5	6	564.8	65	63	65	46
2	20	113	317	321	.66	1.7	7	572.7	68	63	66	45
3	30	114	320	320	.71	1.8	8	580.562	71	64	75	48
1	40	115	319	322	.56	1.4	7	587.6	72	64	81	53
2	50	115	320	320	.67	1.7	8	595.4	72	64	84	53
3	60	115	320	320	.73	1.9	8	603.623	73	65	75	53
1	70	117	317	320	.61	1.5	7	610.5	71	65	77	53
2	80	117	313	319	.66	1.7	8	618.4	74	66	79	52
3	90	113	314	317	.75	1.9	9	626.343	75	66	81	53
1	100	114	315	320	.60	1.5	7	633.1	75	66	85	55
2	110	114	319	319	.67	1.7	8	646.6	76	66	80	54
3	120	114	317	320	.75	1.9	9	650.643	77	67	76	54
12	120	(114)	313	317	(.6130)	(1.7)	9	93.045	(69)	77	54	

# Emissions Measurement Company: Method 5/202 Data Sheet

EMCo Job #:	045AS 284/60	Operator(s):	SB/AB
Client:	PC HTG	Barometric pressure ("Hg):	23.74
Source:	U2	Static pressure ("H <sub>2</sub> O):	-3.0
Date:	12/6/17	Leak Check ("H <sub>2</sub> O @ Vac):	0.00@15"
Run #		Leak Check ("H <sub>2</sub> O @ Vac):	0.00@13"
Meterbox ID:	M5-5	Pitot ID / Coeff:	.84
Meterbox Y = .9979	ΔH@ = 1.948	Pitot Leak Check:	
O <sub>2</sub> %:	~7	Nozzle Diameter:	2.73
CO <sub>2</sub> %:	~12	K Factor:	2.6
Start Time	720	Stop Time	933

Impinger Weights (x.x g)	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4 (SG)		
Total		
	Total	

Traverse Point	Sample Time	Stack Temp (°F)	Probe Temp (°F)	Filter Temp (°F)	Velocity Ap. (°H <sub>2</sub> O)	Orifice Pressure ΔH (°H <sub>2</sub> O)	Vacuum (°Hg)	Sample Volume (ft <sup>3</sup> )	DGM Temp (°F) Inlet	DGM Temp (°F) Outlet	CPM Filter Temp (°F)	Imp. Outlet Temp (°F)
1	10	112	311	312	.52	1.4	6	365.091				
2	20	112	314	312	.68	1.8	7	372.8	46	45	67	45
3	30	113	318	315	.75	2.0	9	380.6	53	48	17	41
								388.922	57	49	73	44
1	40	112	320	320	.58	1.5	7	396.5	61	59	77	53
2	50	113	319	317	.65	1.7	7	404.4	63	53	70	54
3	60	113	317	319	.73	1.9	8	412.165	65	54	71	54
1	70	111	312	319	.60	1.6	7	419.6	63	54	76	50
2	80	110	315	320	.68	1.8	8	427.7	66	52	77	48
3	90	112	314	321	.73	1.9	8	435.977	68	58	80	50
1	100	113	313	315	.55	1.4	6	443.0	66	59	81	50
2	110	113	316	318	.68	1.6	7	451.1	68	59	82	50
3	120	112	315	320	.72	1.9	8	459.264	70	60	84	52
12	120	(112)	311	312	(.8085)	(1.7)	9	(94.135)	(58)	(75)	(54)	

# EMCO

MISSIONS MEASUREMENT COMPANY

## EPA Method 5/202 Moisture Datasheet

Job Code

045AS-284160

Date

12-6-17

Operator

AB

Run # HTG U2 R1

#1563

Tin 2312

Impinger	Tare Weight	Final Weight
Impinger 1	725.3	826.3
Impinger 2	687.0	700.5
Impinger 3	777.3	925.4
Impinger 4	898.5	838.4
Sum	3088.1	3290.6
Total Moisture Gain:	(202.5)	

Run #

#1560

#22842

Impinger	Tare Weight	Final Weight
Impinger 1	717.0	785.4
Impinger 2	637.0	660.2
Impinger 3	565.1	618.3
Impinger 4	929.5	960.0
Sum	2849.6	3023.9
Total Moisture Gain:	(175.3)	

Run #

F # 1556 T # 2304

Impinger	Tare Weight	Final Weight
Impinger 1	522.7	622.0
Impinger 2	653.0	678.5
Impinger 3	789.3	939.0
Impinger 4	893.8	922.0
Sum	2858.8	3061.5
Total Moisture Gain:	(202.7)	



**Project PC17-0001**  
**Appendix C: Lab Data**  
Gravimetric Analysis



## EPA Method 5 Gravimetric Analysis Log

Project Code:	PC17-1.20
Unit ID:	Huntington Unit 2

### Front-Half Particulate Matter Filter Catch

Filter #	Run #1		Run #2		Run #3	
	Date	Weight (g)	Date	Weight (g)	Date	Weight (g)
Final Weight #1 (g)	12/11/17	0.3742	12/11/17	0.3778	12/11/17	0.3785
Final Weight #2 (g)	12/12/17	0.3739	12/12/17	0.3779	12/12/17	0.3784
Tare Weight #1 (g)	10/19/17	0.3721	10/19/17	0.3717	10/19/17	0.3730
Tare Weight #2 (g)	10/20/17	0.3722	10/20/17	0.3717	10/20/17	0.3728
Filter Catch (g)	0.0019		0.0062		0.0056	

### Front-Half Particulate Matter Acetone Rinse Catch

Dish #	Run #1		Run #2		Run #3	
	Date	Weight (g)	Date	Weight (g)	Date	Weight (g)
Final Weight #1 (g)	12/11/17	6.3765	12/11/17	6.4649	12/11/17	6.4623
Final Weight #2 (g)	12/12/17	6.3767	12/12/17	6.4652	12/12/17	6.4626
Tare Weight #1 (g)	11/29/17	6.3744	11/29/17	6.4535	11/29/17	6.4583
Tare Weight #2 (g)	11/30/17	6.3748	11/30/17	6.4532	11/30/17	6.4586
Rinse Catch (g)	0.0020		0.0117		0.0040	

### Total Particulate Catch

	Run #1	Run #2	Run #3
Filter Catch (g)	0.0019	0.0062	0.0056
+ Rinse Catch (g)	0.0020	0.0117	0.0040
Total PM (g)	0.0039	0.0179	0.0096



## EPA Method 5/202 Gravimetric Analysis Report

Project Code: PC17-1.20  
Date Finalized: 12/16/2017  
Analyst: Kormylo

Laboratory Results Summary	
Sample ID	Filterable Particulate Matter (mg)
Huntington Unit 2, Run #1	3.9
Huntington Unit 2, Run #2	17.9
Huntington Unit 2, Run #3	9.6

### Analytical Narrative

Quartz fiber filters were dessicated and tared to a constant weight in the EMCo laboratory prior to sampling. Following testing, the filters were dessicated for at least 24 hours, then weighed to a constant weight ( $\pm 0.5$  mg). The acetone rinses were measured to the nearest milliliter, transferred to tared aluminum weighing dishes, taken to dryness under a fume hood, dessicated for at least 24 hours, then weighed to a constant weight ( $\pm 0.5$  mg). Each result above represents total filterable particulate matter for each test run (acetone rinse + filter catch), with no blank correction performed unless otherwise indicated.

### Instrumentation

All measurements were taken using a Torbal Model AGCN200 Analytical Balance under laboratory conditions. The instrument is auto-calibrated and challenged with three NIST-traceable reference weights daily.

### Detection Limit / Sensitivity

All measurements are recorded to 0.0001g (0.1mg).

### Notes

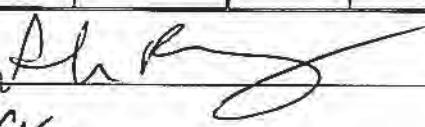
No deviations from the analytical procedures from EPA Method 5 were noted. All samples were received in good condition. After analysis, all samples are archived for a period of one year.

### Attachments

Gravimetric Analysis Logs

Sample Chain of Custody

## Laboratory Chain of Custody Record

Project Code:	045-AS-127698						
Client:	Pacificorp						
Facility:	Huntington						
Unit:	Unit 1+2						
Sample Date(s):	12-5, 12-6						
Project Manager:	Andrew Brunning						
Sample ID / Run #	Filter ID	Front ½ Acetone		Back ½ Hexane		Back ½ Water	
		Tin ID	Volume (mL)	Tin ID	Volume (mL)	Baggie ID	Volume (mL)
TB				2303	80m1	560	130m1
U1 R1	1456	2256	19.5	2301	125m1	583	150m1
U1 R2	1454	2268	19.6	2283	140m1	582	170m1
U1 R3	1452	2316	3.0	2310	120m1	581	150m1
U2 R1	1563	2312		2308	130m1	598	175m1
U2 R2	1560	2284		2306	100m1	550	125m1
U2 R3	1556	2304		2259	95m1	608	160m1
Relinquished by:				Date:	12/7/17		
Received by:				Date	n		



**Project PC17-0001**  
**Appendix D: CEMS Data**  
CEMS Printouts for Test Runs

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/06/2017 07:20 Through 12/06/2017 09:33

Time Online Criteria: 1 minute(s)

Source Parameter (Unit)	UNIT2				
	BARPRESS (INHG)	CO2 (PCT)	OPACITY (PCT)	STKTEMP (DEGF)	UNITLOAD (MW)
12/06/17 07:20	23.967	11.0	1.2	110.82	471
12/06/17 07:21	23.967	11.0	1.2	110.89	471
12/06/17 07:22	23.968	10.9	1.2	110.85	471
12/06/17 07:23	23.967	10.9	1.2	110.59	471
12/06/17 07:24	23.967	11.0	1.2	110.56	471
12/06/17 07:25	23.968	11.1	1.3	110.63	472
12/06/17 07:26	23.968	11.0	1.3	110.80	472
12/06/17 07:27	23.968	11.0	1.3	110.83	472
12/06/17 07:28	23.968	11.0	1.3	110.67	472
12/06/17 07:29	23.968	10.9	1.3	110.63	472
12/06/17 07:30	23.969	10.9	1.3	110.64	471
12/06/17 07:31	23.969	11.0	1.3	110.46	472
12/06/17 07:32	23.970	11.0	1.3	110.45	471
12/06/17 07:33	23.970	11.0	1.3	110.51	472
12/06/17 07:34	23.970	11.0	1.2	110.32	473
12/06/17 07:35	23.970	11.0	1.2	110.29	473
12/06/17 07:36	23.970	11.0	1.3	110.37	473
12/06/17 07:37	23.971	11.0	1.2	110.05	474
12/06/17 07:38	23.972	11.1	1.2	109.41	474
12/06/17 07:39	23.972	11.1	1.2	109.63	474
12/06/17 07:40	23.972	11.0	1.2	110.31	473
12/06/17 07:41	23.972	10.9	1.2	110.43	472
12/06/17 07:42	23.972	10.9	1.2	110.68	470
12/06/17 07:43	23.971	10.9	1.2	110.71	469
12/06/17 07:44	23.971	10.9	1.2	110.36	469
12/06/17 07:45	23.971	10.9	1.2	110.23	470
12/06/17 07:46	23.971	11.0	1.2	110.45	470
12/06/17 07:47	23.971	11.0	1.2	110.43	469
12/06/17 07:48	23.971	11.0	1.2	110.22	469
12/06/17 07:49	23.971	10.9	1.2	110.23	469
12/06/17 07:50	23.970	11.0	1.2	110.56	469
12/06/17 07:51	23.970	11.0	1.2	110.57	470
12/06/17 07:52	23.970	11.1	1.2	110.29	471
12/06/17 07:53	23.969	11.1	1.1	110.25	473
12/06/17 07:54	23.969	11.0	1.1	110.18	473
12/06/17 07:55	23.969	11.1	1.1	110.09	473
12/06/17 07:56	23.969	11.1	1.2	110.10	473
12/06/17 07:57	23.969	11.0	1.1	109.92	472

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

C = Calibration

S = Substituted

T = Out Of Control

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/06/2017 07:20 Through 12/06/2017 09:33

Time Online Criteria: 1 minute(s)

12/06/17	07:58	23.969	11.0	1.1	110.08	472
12/06/17	07:59	23.969	11.0	1.1	110.23	472
12/06/17	08:00	23.969	10.9 I	1.1	110.42	472
12/06/17	08:01	23.969	3.7 I	1.2	110.46	472
12/06/17	08:02	23.969	6.5 I	1.2	110.36	472
12/06/17	08:03	23.969	11.0 I	1.2	110.32	472
12/06/17	08:04	23.970	11.0 I	1.2	110.50	472
12/06/17	08:05	23.970	11.0 I	1.2	110.48	472
12/06/17	08:06	23.970	11.0	1.2	110.46	473
12/06/17	08:07	23.970	11.0	1.2	110.48	472
12/06/17	08:08	23.971	10.9	1.2	110.39	472
12/06/17	08:09	23.971	10.9	1.2	110.45	472
12/06/17	08:10	23.970	10.9	1.3	110.51	471
12/06/17	08:11	23.970	11.0	1.3	110.38	471
12/06/17	08:12	23.971	11.0	1.3	110.28	471
12/06/17	08:13	23.972	11.0	1.2	110.34	471
12/06/17	08:14	23.973	11.0	1.3	110.63	472
12/06/17	08:15	23.973	10.9	1.2	110.67	473
12/06/17	08:16	23.973	11.0	1.2	110.34	473
12/06/17	08:17	23.972	11.0	1.3	110.29	473
12/06/17	08:18	23.972	11.0	1.2	110.38	474
12/06/17	08:19	23.972	11.0	1.2	110.51	474
12/06/17	08:20	23.972	10.9	1.3	110.52	474
12/06/17	08:21	23.972	10.9	1.3	110.33	475
12/06/17	08:22	23.971	11.0	1.3	110.10	476
12/06/17	08:23	23.971	11.0	1.2	109.90	476
12/06/17	08:24	23.971	11.0	1.2	110.14	477
12/06/17	08:25	23.971	10.9	1.2	110.37	475
12/06/17	08:26	23.971	10.9	1.2	110.60	474
12/06/17	08:27	23.970	10.8	1.2	110.84	472
12/06/17	08:28	23.971	10.8	1.3	110.86	471
12/06/17	08:29	23.971	10.8	1.2	110.67	470
12/06/17	08:30	23.971	10.9	1.2	110.62	469
12/06/17	08:31	23.972	10.8	1.2	110.03	468
12/06/17	08:32	23.973	10.8	1.2	107.93	467
12/06/17	08:33	23.973	10.8	1.2	105.33	467
12/06/17	08:34	23.974	10.9	1.2	103.37	468
12/06/17	08:35	23.974	10.9	1.2	102.14	469
12/06/17	08:36	23.975	11.1	1.2	101.21	470
12/06/17	08:37	23.976	11.2	1.2	101.41	471
12/06/17	08:38	23.976	11.1	1.1	102.01	471

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

C = Calibration

S = Substituted

T = Out Of Control

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/06/2017 07:20 Through 12/06/2017 09:33

Time Online Criteria: 1 minute(s)

12/06/17	08:39	23.976	11.1	1.1	102.53	471
12/06/17	08:40	23.976	11.0	1.1	102.23	471
12/06/17	08:41	23.976	11.0	1.1	100.71	471
12/06/17	08:42	23.977	11.0	1.1	100.59	470
12/06/17	08:43	23.978	11.0	1.1	100.92	469
12/06/17	08:44	23.978	11.0	1.1	100.99	469
12/06/17	08:45	23.978	11.1	1.1	105.33	469
12/06/17	08:46	23.978	11.0	1.1	109.34	470
12/06/17	08:47	23.978	11.0	1.2	109.42	471
12/06/17	08:48	23.978	11.0	1.1	109.69	471
12/06/17	08:49	23.978	11.0	1.2	109.83	471
12/06/17	08:50	23.978	10.9	1.2	109.68	471
12/06/17	08:51	23.978	11.0	1.2	110.23	471
12/06/17	08:52	23.979	10.9	1.2	110.44	470
12/06/17	08:53	23.980	10.9	1.2	110.38	470
12/06/17	08:54	23.980	10.9	1.2	110.17	471
12/06/17	08:55	23.981	11.1	1.2	109.97	472
12/06/17	08:56	23.981	11.0	1.2	110.21	473
12/06/17	08:57	23.982	11.0	1.3	110.31	474
12/06/17	08:58	23.982	11.0	1.3	110.16	475
12/06/17	08:59	23.983	11.1	1.3	110.29	475
12/06/17	09:00	23.984	10.9	1.3	110.55	474
12/06/17	09:01	23.984	11.0	1.3	110.70	473
12/06/17	09:02	23.984	10.9	1.3	110.83	473
12/06/17	09:03	23.985	10.9	1.3	110.50	473
12/06/17	09:04	23.986	11.1	1.3	110.21	474
12/06/17	09:05	23.986	11.0	1.3	110.27	475
12/06/17	09:06	23.987	11.0	1.3	110.26	476
12/06/17	09:07	23.988	11.2	1.2	110.25	476
12/06/17	09:08	23.987	11.1	1.2	110.71	476
12/06/17	09:09	23.988	11.0	1.2	111.08	475
12/06/17	09:10	23.989	10.9	1.2	110.95	474
12/06/17	09:11	23.989	10.9	1.2	110.60	473
12/06/17	09:12	23.990	11.0	1.2	110.51	472
12/06/17	09:13	23.990	10.9	1.2	110.60	471
12/06/17	09:14	23.990	10.9	1.2	110.55	471
12/06/17	09:15	23.990	11.0	1.3	110.43	472
12/06/17	09:16	23.990	11.1	1.2	110.39	474
12/06/17	09:17	23.990	11.1	1.2	110.84	475
12/06/17	09:18	23.991	11.0	1.2	110.44	476
12/06/17	09:19	23.991	11.0	1.2	110.50	475

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

C = Calibration

S = Substituted

T = Out Of Control

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/06/2017 07:20 Through 12/06/2017 09:33

Time Online Criteria: 1 minute(s)

12/06/17	09:20	23.992	11.0	1.2	110.59	476
12/06/17	09:21	23.992	11.0	1.1	110.50	475
12/06/17	09:22	23.992	11.0	1.1	107.95	474
12/06/17	09:23	23.991	11.0	1.1	104.96	473
12/06/17	09:24	23.991	11.1	1.1	103.62	473
12/06/17	09:25	23.992	11.1	1.1	103.09	474
12/06/17	09:26	23.992	11.1	1.1	102.57	474
12/06/17	09:27	23.992	11.1	1.1	102.64	474
12/06/17	09:28	23.993	11.1	1.1	103.35	473
12/06/17	09:29	23.993	11.1	1.1	103.87	472
12/06/17	09:30	23.994	11.0	1.2	102.94	472
12/06/17	09:31	23.994	11.1	1.2	100.52	472
12/06/17	09:32	23.993	11.2	1.2	101.10	472
12/06/17	09:33	23.992	11.1	1.2	101.63	472

Average	23.977	11.0	1.2	108.93	472
Minimum	23.967	10.8	1.1	100.52	467
Maximum	23.994	11.2	1.3	111.08	477
Summation	3,212.883	1,406.7	161.2	14,596.67	63,263
Included Data Points	134	128	134	134	134
Total number of Data Points	134	134	134	134	134

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

Report Generated 12/06/17 09:44

C = Calibration

S = Substituted

T = Out Of Control

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/06/2017 10:10 Through 12/06/2017 12:25

Time Online Criteria: 1 minute(s)

Source Parameter (Unit)	UNIT2				
	BARPRESS (INHG)	CO2 (PCT)	OPACITY (PCT)	STKTEMP (DEGF)	UNITLOAD (MW)
12/06/17 10:10	23.998	11.1	1.2	106.68	475
12/06/17 10:11	23.998	11.1	1.2	111.03	476
12/06/17 10:12	23.999	11.0	1.1	112.35	477
12/06/17 10:13	23.999	10.9	1.1	112.14	477
12/06/17 10:14	23.999	11.0	1.1	112.04	477
12/06/17 10:15	23.999	11.0	1.1	112.41	476
12/06/17 10:16	23.999	10.8	1.1	112.63	475
12/06/17 10:17	24.000	10.8	1.1	112.17	474
12/06/17 10:18	23.999	10.9	1.1	112.05	473
12/06/17 10:19	23.999	10.9	1.1	112.34	472
12/06/17 10:20	23.999	10.8	1.1	112.48	472
12/06/17 10:21	23.998	10.8	1.2	112.46	472
12/06/17 10:22	23.997	10.9	1.1	112.21	473
12/06/17 10:23	23.997	11.0	1.2	112.00	474
12/06/17 10:24	23.998	10.9	1.2	111.85	475
12/06/17 10:25	23.998	11.0	1.2	111.81	475
12/06/17 10:26	23.998	10.9	1.1	111.89	475
12/06/17 10:27	23.998	10.9	1.2	111.93	475
12/06/17 10:28	23.998	10.9	1.2	111.93	474
12/06/17 10:29	23.998	10.9	1.2	112.02	474
12/06/17 10:30	23.997	10.9	1.2	112.05	473
12/06/17 10:31	23.996	10.8	1.2	111.95	473
12/06/17 10:32	23.994	10.9	1.2	112.01	473
12/06/17 10:33	23.994	10.8	1.3	112.24	473
12/06/17 10:34	23.994	10.7	1.3	111.98	474
12/06/17 10:35	23.994	10.9	1.2	111.42	476
12/06/17 10:36	23.994	11.0	1.2	111.45	476
12/06/17 10:37	23.994	10.9	1.3	111.97	476
12/06/17 10:38	23.994	10.9	1.2	112.04	476
12/06/17 10:39	23.994	10.9	1.2	111.78	476
12/06/17 10:40	23.994	10.8	1.2	111.67	476
12/06/17 10:41	23.994	10.9	1.2	111.88	475
12/06/17 10:42	23.993	10.9	1.2	112.10	475
12/06/17 10:43	23.993	10.9	1.2	111.95	474
12/06/17 10:44	23.993	10.9	1.2	111.68	474
12/06/17 10:45	23.994	11.0	1.2	111.76	475
12/06/17 10:46	23.994	10.9	1.2	111.81	475
12/06/17 10:47	23.995	10.9	1.2	111.58	476

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

C = Calibration

S = Substituted

T = Out Of Control

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/06/2017 10:10 Through 12/06/2017 12:25

Time Online Criteria: 1 minute(s)

12/06/17	10:48	23.994	10.9	1.1	111.52	477
12/06/17	10:49	23.993	10.9	1.2	111.56	478
12/06/17	10:50	23.992	10.9	1.2	111.51	478
12/06/17	10:51	23.991	10.9	1.2	111.77	477
12/06/17	10:52	23.991	10.9	1.2	111.98	477
12/06/17	10:53	23.990	10.8	1.1	111.86	476
12/06/17	10:54	23.990	10.9	1.1	111.90	475
12/06/17	10:55	23.990	10.7	1.1	109.62	474
12/06/17	10:56	23.989	10.8	1.1	107.70	473
12/06/17	10:57	23.988	10.9	1.1	106.05	471
12/06/17	10:58	23.987	10.9	1.1	105.02	471
12/06/17	10:59	23.986	10.9	1.1	104.47	471
12/06/17	11:00	23.986	10.9	1.1	104.05	472
12/06/17	11:01	23.985	10.9	1.1	104.42	473
12/06/17	11:02	23.984	11.0	1.1	104.50	474
12/06/17	11:03	23.984	11.0	1.1	103.05	475
12/06/17	11:04	23.982	11.1	1.1	103.40	476
12/06/17	11:05	23.981	11.1	1.1	105.69	476
12/06/17	11:06	23.981	11.1	1.2	109.03	476
12/06/17	11:07	23.981	11.0	1.2	110.55	476
12/06/17	11:08	23.980	11.0	1.2	111.36	476
12/06/17	11:09	23.980	10.9	1.2	111.46	476
12/06/17	11:10	23.979	10.9	1.2	111.34	477
12/06/17	11:11	23.978	11.0	1.2	111.31	479
12/06/17	11:12	23.977	11.0	1.2	111.36	480
12/06/17	11:13	23.977	11.0	1.2	111.43	480
12/06/17	11:14	23.978	11.0	1.2	111.50	480
12/06/17	11:15	23.978	10.9	1.2	111.72	479
12/06/17	11:16	23.977	10.9	1.3	111.81	478
12/06/17	11:17	23.976	10.9	1.3	111.70	478
12/06/17	11:18	23.975	10.9	1.3	111.66	479
12/06/17	11:19	23.974	11.0	1.3	111.83	480
12/06/17	11:20	23.974	10.9	1.3	112.05	480
12/06/17	11:21	23.974	10.9	1.3	112.04	479
12/06/17	11:22	23.972	10.9	1.3	112.09	478
12/06/17	11:23	23.971	10.7	1.3	112.32	476
12/06/17	11:24	23.970	10.7	1.3	112.29	474
12/06/17	11:25	23.969	10.8	1.2	112.26	473
12/06/17	11:26	23.969	10.8	1.3	112.38	473
12/06/17	11:27	23.968	10.8	1.2	112.24	473
12/06/17	11:28	23.966	10.9	1.2	112.17	472

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

C = Calibration

S = Substituted

T = Out Of Control

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/06/2017 10:10 Through 12/06/2017 12:25

Time Online Criteria: 1 minute(s)

12/06/17	11:29	23.965	10.7	1.2	112.27	471
12/06/17	11:30	23.964	10.8	1.2	112.25	471
12/06/17	11:31	23.963	10.8	1.2	112.25	471
12/06/17	11:32	23.962	10.7	1.2	112.23	471
12/06/17	11:33	23.962	10.8	1.2	112.12	470
12/06/17	11:34	23.961	10.8	1.2	111.99	471
12/06/17	11:35	23.961	10.8	1.1	111.76	472
12/06/17	11:36	23.960	10.9	1.2	111.68	473
12/06/17	11:37	23.959	10.9	1.1	111.72	473
12/06/17	11:38	23.959	10.9	1.2	111.72	474
12/06/17	11:39	23.958	10.9	1.2	111.69	475
12/06/17	11:40	23.958	11.0	1.2	111.82	475
12/06/17	11:41	23.958	10.9	1.1	111.89	475
12/06/17	11:42	23.958	10.9	1.1	112.00	475
12/06/17	11:43	23.958	10.8	1.1	111.90	476
12/06/17	11:44	23.956	11.0	1.1	111.73	477
12/06/17	11:45	23.955	11.0	1.1	111.71	478
12/06/17	11:46	23.954	11.0	1.2	111.71	478
12/06/17	11:47	23.954	11.0	1.1	111.75	478
12/06/17	11:48	23.954	10.9	1.1	110.32	478
12/06/17	11:49	23.953	10.9	1.1	107.58	478
12/06/17	11:50	23.951	11.1	1.1	105.80	478
12/06/17	11:51	23.950	11.0	1.1	104.94	477
12/06/17	11:52	23.950	11.0	1.1	104.22	477
12/06/17	11:53	23.949	11.0	1.1	104.24	476
12/06/17	11:54	23.950	10.9	1.1	104.75	475
12/06/17	11:55	23.951	11.0	1.1	105.33	475
12/06/17	11:56	23.952	11.0	1.1	105.52	474
12/06/17	11:57	23.950	10.9	1.2	105.24	474
12/06/17	11:58	23.949	10.9	1.2	104.38	473
12/06/17	11:59	23.949	11.0	1.2	104.52	471
12/06/17	12:00	23.950	10.8 I	1.2	108.15	470
12/06/17	12:01	23.950	3.7 I	1.3	111.43	469
12/06/17	12:02	23.949	6.7 I	1.2	111.47	469
12/06/17	12:03	23.947	10.8 I	1.3	111.51	469
12/06/17	12:04	23.947	10.9 I	1.3	111.59	469
12/06/17	12:05	23.947	10.8 I	1.3	111.76	469
12/06/17	12:06	23.946	10.9	1.2	110.82	470
12/06/17	12:07	23.944	11.0	1.2	107.20	471
12/06/17	12:08	23.944	11.0	1.2	105.63	471
12/06/17	12:09	23.946	11.0	1.2	104.96	472

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

C = Calibration

S = Substituted

T = Out Of Control

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/06/2017 10:10 Through 12/06/2017 12:25

Time Online Criteria: 1 minute(s)

12/06/17	12:10	23.947	11.1	1.2	104.57	472
12/06/17	12:11	23.945	11.0	1.2	104.01	473
12/06/17	12:12	23.945	11.1	1.2	103.40	475
12/06/17	12:13	23.946	11.2	1.2	104.47	475
12/06/17	12:14	23.946	11.0	1.1	105.28	474
12/06/17	12:15	23.946	10.9	1.1	104.38	473
12/06/17	12:16	23.946	11.0	1.1	103.40	473
12/06/17	12:17	23.945	11.0	1.1	104.13	473
12/06/17	12:18	23.946	10.9	1.1	106.25	473
12/06/17	12:19	23.946	11.0	1.1	110.51	473
12/06/17	12:20	23.945	11.1	1.1	110.86	473
12/06/17	12:21	23.943	10.9	1.1	110.79	474
12/06/17	12:22	23.943	11.0	1.1	110.75	475
12/06/17	12:23	23.944	11.1	1.1	110.93	476
12/06/17	12:24	23.945	11.0	1.1	110.86	477
12/06/17	12:25	23.944	11.1	1.1	110.92	478

Average	23.973	10.9	1.2	110.01	475
Minimum	23.943	10.7	1.1	103.05	469
Maximum	24.000	11.2	1.3	112.63	480
Summation	3,260.295	1,420.2	159.5	14,960.77	64,549

Included Data Points	136	130	136	136	136
Total number of Data Points	136	136	136	136	136

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

Report Generated 12/06/17 12:32 PM

C = Calibration

S = Substituted

T = Out Of Control

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/06/2017 12:52 Through 12/06/2017 15:05

Time Online Criteria: 1 minute(s)

Source Parameter (Unit)	UNIT2				
	BARPRESS (INHG)	CO2 (PCT)	OPACITY (PCT)	STKTEMP (DEGF)	UNITLOAD (MVA)
12/06/17 12:52	23.937	10.9	1.9	107.47	469
12/06/17 12:53	23.938	11.0	1.6	106.64	470
12/06/17 12:54	23.938	11.1	1.5	106.24	471
12/06/17 12:55	23.938	11.1	1.5	106.72	473
12/06/17 12:56	23.936	11.1	1.3	109.35	474
12/06/17 12:57	23.934	11.1	1.3	111.61	474
12/06/17 12:58	23.934	11.0	1.2	111.00	472
12/06/17 12:59	23.934	11.0	1.2	107.95	470
12/06/17 13:00	23.934	11.0	1.2	107.48	468
12/06/17 13:01	23.935	10.9	1.1	107.30	466
12/06/17 13:02	23.935	10.9	1.1	106.69	465
12/06/17 13:03	23.934	11.0	1.1	106.19	464
12/06/17 13:04	23.933	11.0	1.1	106.36	463
12/06/17 13:05	23.933	11.0	1.2	107.00	463
12/06/17 13:06	23.932	11.0	1.1	107.07	464
12/06/17 13:07	23.931	11.1	1.1	106.06	464
12/06/17 13:08	23.929	11.1	1.1	105.17	464
12/06/17 13:09	23.928	11.1	1.1	104.56	465
12/06/17 13:10	23.928	11.1	1.2	108.38	465
12/06/17 13:11	23.927	11.1	1.2	111.28	465
12/06/17 13:12	23.925	11.0	1.1	111.80	465
12/06/17 13:13	23.923	11.0	1.0	112.01	466
12/06/17 13:14	23.924	11.0	1.0	111.91	465
12/06/17 13:15	23.928	11.1	1.0	111.77	465
12/06/17 13:16	23.930	11.0	1.0	111.92	465
12/06/17 13:17	23.929	11.0	1.0	112.11	466
12/06/17 13:18	23.926	11.0	1.0	112.23	467
12/06/17 13:19	23.928	11.1	1.1	111.94	469
12/06/17 13:20	23.931	11.1	1.1	111.79	470
12/06/17 13:21	23.933	11.1	1.1	112.04	470
12/06/17 13:22	23.935	11.0	1.0	112.20	470
12/06/17 13:23	23.933	11.0	1.0	112.27	471
12/06/17 13:24	23.929	10.9	1.0	112.34	471
12/06/17 13:25	23.926	11.0	1.1	112.44	470
12/06/17 13:26	23.925	10.9	1.1	112.50	469
12/06/17 13:27	23.925	10.9	1.1	112.52	468
12/06/17 13:28	23.925	10.9	1.1	112.64	466
12/06/17 13:29	23.924	10.9	1.1	112.64	465

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

C = Calibration

S = Substituted

T = Out Of Control

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/06/2017 12:52 Through 12/06/2017 15:05

Time Online Criteria: 1 minute(s)

12/06/17	13:30	23.926	10.9	1.1	112.46	465
12/06/17	13:31	23.928	10.8	1.1	112.37	464
12/06/17	13:32	23.930	10.8	1.2	112.60	463
12/06/17	13:33	23.929	10.8	1.2	112.46	463
12/06/17	13:34	23.928	10.9	1.2	111.97	464
12/06/17	13:35	23.928	11.0	1.2	111.80	465
12/06/17	13:36	23.928	11.0	1.2	111.89	467
12/06/17	13:37	23.928	11.1	1.2	111.94	468
12/06/17	13:38	23.927	11.1	1.2	111.92	470
12/06/17	13:39	23.927	11.1	1.2	112.09	471
12/06/17	13:40	23.929	11.0	1.1	112.25	472
12/06/17	13:41	23.929	10.9	1.1	112.21	471
12/06/17	13:42	23.930	10.9	1.1	112.10	470
12/06/17	13:43	23.929	11.0	1.1	112.17	469
12/06/17	13:44	23.928	10.9	1.1	112.29	468
12/06/17	13:45	23.929	10.8	1.1	112.32	468
12/06/17	13:46	23.928	10.9	1.1	112.19	468
12/06/17	13:47	23.928	11.0	1.1	111.86	469
12/06/17	13:48	23.928	11.0	1.1	111.89	470
12/06/17	13:49	23.926	11.0	1.1	111.98	471
12/06/17	13:50	23.925	11.0	1.1	111.88	471
12/06/17	13:51	23.926	11.1	1.1	111.89	470
12/06/17	13:52	23.925	10.9	1.1	112.04	470
12/06/17	13:53	23.925	10.9	1.1	112.10	470
12/06/17	13:54	23.925	10.9	1.1	111.29	471
12/06/17	13:55	23.926	11.0	1.1	105.74	473
12/06/17	13:56	23.925	11.1	1.1	104.67	475
12/06/17	13:57	23.926	11.2	1.0	103.97	476
12/06/17	13:58	23.925	11.2	1.0	103.71	477
12/06/17	13:59	23.924	11.2	1.0	103.54	478
12/06/17	14:00	23.925	11.2	1.0	104.02	479
12/06/17	14:01	23.925	11.1	1.0	105.08	478
12/06/17	14:02	23.924	11.1	1.0	105.56	475
12/06/17	14:03	23.925	11.1	1.0	105.49	473
12/06/17	14:04	23.923	11.0	1.1	104.70	472
12/06/17	14:05	23.922	10.9	1.1	104.36	471
12/06/17	14:06	23.921	11.0	1.1	107.68	470
12/06/17	14:07	23.921	11.0	1.1	111.56	468
12/06/17	14:08	23.920	10.9	1.1	111.52	467
12/06/17	14:09	23.919	10.9	1.2	111.35	467
12/06/17	14:10	23.920	11.0	1.1	111.19	468

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

C = Calibration

S = Substituted

T = Out Of Control

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/06/2017 12:52 Through 12/06/2017 15:05

Time Online Criteria: 1 minute(s)

12/06/17	14:11	23.919	11.0	1.2	111.26	469
12/06/17	14:12	23.919	11.0	1.1	111.47	470
12/06/17	14:13	23.918	11.0	1.1	111.58	470
12/06/17	14:14	23.919	10.9	1.2	111.59	470
12/06/17	14:15	23.920	10.9	1.2	111.40	471
12/06/17	14:16	23.921	11.1	1.3	111.27	472
12/06/17	14:17	23.921	11.0	1.2	111.74	473
12/06/17	14:18	23.921	11.0	1.3	111.70	473
12/06/17	14:19	23.924	11.0	1.3	111.64	475
12/06/17	14:20	23.922	11.0	1.2	111.72	476
12/06/17	14:21	23.922	11.0	1.3	111.74	477
12/06/17	14:22	23.922	11.1	1.2	111.68	477
12/06/17	14:23	23.923	11.0	1.2	111.98	477
12/06/17	14:24	23.922	10.8	1.2	112.22	477
12/06/17	14:25	23.923	10.8	1.3	112.12	476
12/06/17	14:26	23.923	10.9	1.3	112.11	476
12/06/17	14:27	23.926	10.8	1.3	112.09	476
12/06/17	14:28	23.925	10.9	1.3	111.93	477
12/06/17	14:29	23.924	10.9	1.3	111.81	477
12/06/17	14:30	23.924	10.9	1.2	112.03	476
12/06/17	14:31	23.924	10.8	1.2	112.32	477
12/06/17	14:32	23.923	10.8	1.2	112.37	476
12/06/17	14:33	23.924	10.8	1.3	112.26	476
12/06/17	14:34	23.923	10.9	1.3	111.92	476
12/06/17	14:35	23.924	10.9	1.2	111.92	475
12/06/17	14:36	23.924	10.8	1.3	112.08	474
12/06/17	14:37	23.924	10.8	1.2	112.04	473
12/06/17	14:38	23.923	10.8	1.2	112.18	472
12/06/17	14:39	23.923	10.7	1.2	112.21	470
12/06/17	14:40	23.923	10.7	1.2	111.96	470
12/06/17	14:41	23.923	10.8	1.2	112.04	471
12/06/17	14:42	23.924	10.8	1.3	111.94	473
12/06/17	14:43	23.925	10.9	1.3	111.62	474
12/06/17	14:44	23.925	11.0	1.2	111.59	476
12/06/17	14:45	23.927	10.9	1.2	112.00	477
12/06/17	14:46	23.926	10.8	1.2	112.11	477
12/06/17	14:47	23.927	10.9	1.2	111.96	477
12/06/17	14:48	23.923	10.9	1.2	112.04	478
12/06/17	14:49	23.923	10.8	1.3	112.11	478
12/06/17	14:50	23.924	10.9	1.3	111.56	478
12/06/17	14:51	23.924	10.8	1.3	108.81	478

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

C = Calibration

S = Substituted

T = Out Of Control

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/06/2017 12:52 Through 12/06/2017 15:05

Time Online Criteria: 1 minute(s)

12/06/17	14:52	23.923	10.8	1.3	107.08	477
12/06/17	14:53	23.921	10.8	1.2	106.57	475
12/06/17	14:54	23.922	10.7	1.3	106.34	475
12/06/17	14:55	23.923	10.8	1.3	105.26	475
12/06/17	14:56	23.924	10.9	1.3	104.89	475
12/06/17	14:57	23.926	10.8	1.3	105.58	476
12/06/17	14:58	23.925	10.9	1.3	105.52	477
12/06/17	14:59	23.924	11.0	1.3	104.89	478
12/06/17	15:00	23.924	11.0	1.3	104.00	478
12/06/17	15:01	23.925	10.9	1.3	104.27	478
12/06/17	15:02	23.925	10.9	1.2	108.45	477
12/06/17	15:03	23.924	10.8	1.3	111.16	475
12/06/17	15:04	23.923	10.7	1.3	111.31	474
12/06/17	15:05	23.925	10.8	1.3	111.52	473

Average	23.926	11.0	1.2	110.12	471
Minimum	23.918	10.7	1.0	103.54	463
Maximum	23.938	11.2	1.9	112.64	479
Summation	3,206.105	1,467.4	158.0	14,756.65	63,166
Included Data Points	134	134	134	134	134
Total number of Data Points	134	134	134	134	134

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

Report Generated 12/06/17 15:12

C = Calibration

S = Substituted

T = Out Of Control



**Project PC17-0001**

**Appendix E: Calibration Information**

Dry Gas Meter Pre-Test and Post-Test Calibrations  
Critical Orifice Calibration Certificate



## EPA Method 5

### Meter Box Calibration by Calibrated Critical Orifice, Leak Check, and Thermocouple Calibration Check English Meter Box Units, English K' Factor

Meter box ID:	MS-5
Meter ID (if applicable):	28U016141
Orifice set ID:	IS
Calibrated by:	D. Stahl
Expires:	4/19/18

#### Meter Box Orifice Calibration

**IMPORTANT** For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above. The Critical Orifice Coefficient, K', must be entered in English units, (ft)<sup>3</sup>/min/(in. Hg)<sup>2</sup>(min).

--- SAMPLE RATE ---		VOLUME CORRECTED		VOLUME NORMED		INITIAL TEMPS.		FINAL TEMPS.		ORIFICE		DRY GAS METER			
$\Delta H$ (in H <sub>2</sub> O)	Sample Rate (scfm)	V <sub>m</sub> (std) (cu ft)	V <sub>c</sub> (cu ft)	V <sub>r</sub> (std) (cu ft)	V <sub>r</sub> (cu ft)	Initial Temp. (deg F)	Inlet (deg F)	Final Temp. (deg F)	Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.27	0.252	4.289	4.286	5.255	5.255	70.0	69.0	70.0	70.0	40	0.2363	20.5	73.0	72.0	72.5
0.58	0.371	4.264	4.265	5.220	5.220	70.0	70.0	70.0	70.0	48	0.3473	19.5	72.0	71.0	71.5
1.00	0.491	4.179	5.094	5.100	5.100	71.0	71.0	72.0	72.0	55	0.4593	18.5	71.0	71.0	71.0
1.70	0.632	4.470	5.448	5.407	5.407	72.0	71.0	74.0	74.0	63	0.5613	17.5	71.0	71.0	71.0
3.00	0.838	4.633	5.709	5.639	5.639	74.0	71.0	76.0	71.0	73	0.7848	15.5	71.0	71.0	71.0

INDICATED VS. ACTUAL

$\Delta H$ (in H <sub>2</sub> O)	Sample Rate (scfm)	V <sub>m</sub> (std) (cu ft)	V <sub>c</sub> (cu ft)
0.27	0.252	4.289	4.286
0.58	0.371	4.264	4.265
1.00	0.491	4.179	5.100
1.70	0.632	4.470	5.448
3.00	0.838	4.633	5.709

--- DRY GAS METER ---

CALIBRATION FACTOR		CALIBRATION FACTOR		
$\Delta H @$	Y <sub>d</sub>	$\Delta H @$	Y <sub>d</sub>	
0.27	0.9892	0.005	1.961	0.012
0.58	1.0003	0.006	1.944	-0.004
1.00	0.9882	0.004	1.913	-0.035
1.70	0.989	-0.005	1.960	0.012
3.00	0.983	-0.011	1.964	0.015

For Calibration Factor Y<sub>d</sub>, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +/-0.02.

For Orifice Calibration Factor Y<sub>d</sub>, the orifice differential pressure in inches of H<sub>2</sub>O that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +/-0.2.

#### Meter Box Pressure Leak Check

Test Pressure, (in H <sub>2</sub> O):	6	Should be 5-7 in. H <sub>2</sub> O
Leak Rate, (in H <sub>2</sub> O/min):	0	Must be zero (manometer level stable for 1 minute)

#### Meter Box Thermocouple Readout Calibration Check

Input Temperature	Allowable Temp. Dev.*	Low	High	Stack	Probe	Filter	Exit	Aux.	Meter In / Out
32	7	25	39	30	30	32	30	30	31
68	8	60	76	68	70	71	67	68	66
120	9	111	129	120	121	122	119	119	119
250	11	239	261	249	252	252	350	352	
350	12	338	362	362	366	366	500	500	
500	14	486	514	514	517	517	701	701	
700	17	683	717	717	717	717	902	902	
900	20	880	920						

\* Reading values must be within 1.5% of reference thermometer values (based on absolute temperature scale) for calibration to be acceptable.

Performed by:

Name: Deek Shal

Singature:

Date: 10/19/17

Yd: 0.9939

$\Delta H @$ : 1.948

Barometric pressure (in. Hg): 24.62

Theoretical critical vacuum: 11.61

No. of orifices used (min. 3): 5

Date: 10/19/17

Location: Den-AT

Date: 10/19/17

Test Vacuum, (in. Hg): 5

Leak Rate, (cm³): 0

Coarse adjust valve fully open, fine adjust fully closed, sample inlet plugged

Must be zero (meter dial static for 1 minute)

#### Meter Box Vacuum Leak Check

Test Vacuum, (in. Hg):	5	Coarse adjust valve fully open, fine adjust fully closed, sample inlet plugged
Leak Rate, (cm³):	0	Must be zero (meter dial static for 1 minute)

QA Criteria:	Average Y <sub>d</sub>	0.9939
	Average $\Delta H @$	1.9484
	Variation of Y <sub>d</sub> 's	PASS
	Variation of $\Delta H @$	PASS
	Vacuum Criteria	PASS

Thermocouple simulator	Model:	Omega
	Serial Number:	14006534
	Cal Date:	10/20/2016

Approved by:

Name: Matthew Parkes

Singature:

Date: 10/19/17

Meter box 6-month calibration form (orifice) RO

## METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES



### ENVIRONMENTAL SUPPLY COMPANY

DATE:	12/27/2017
METER ID #:	M5-5

METER SERIAL #:	28u0716141
CRITICAL ORIFICE SET SERIAL #:	1531s

ORIFICE #	RUN #	K <sup>*</sup>	TESTED VACUUM (in Hg)	DGM READINGS (FT <sup>3</sup> )		AMBIENT TEMP (°F)	DGM INLET TEMP (INITIAL FINAL)	DGM OUTLET TEMP (INITIAL FINAL)	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H <sub>2</sub> O)	(1) V <sub>m</sub> (STD)	(2) V <sub>cr</sub> (STD)	(3) Y	Y % DIFF TO AVERAGE Y	Y % DIFF WITH OTHER ORIFICES	ΔH <sub>@</sub>	
				INITIAL	FINAL													
<b>18</b>	1	0.4976	18	651.114	653.969	2.855	57	22	20	22	2.5	5.00	1.1	2.5820	2.6970	1.045	1.92	
	2	0.4976	18	653.969	656.829	2.860	57	26	29	26	25.75	5.00	1.1	2.5692	2.6970	1.050	1.91	
	3	0.4976	18	656.829	659.721	2.892	59	29	35	26	29.5	5.00	1.1	2.5780	2.6918	1.044	1.90	
<b>23</b>	1	0.6366	18	659.721	663.482	3.761	59	35	38	31	33	5.00	1.8	3.3358	3.4437	1.032	1.89	
	2	0.6366	18	663.482	667.283	3.801	58	38	42	31	33	5.00	1.8	3.3508	3.4520	1.029	1.88	
<b>16</b>	1	0.4449	19	667.283	669.947	2.664	58	42	44	33	36	38.75	5.00	0.9	2.3293	2.4090	1.034	1.91
	2	0.4449	19	669.947	672.648	2.701	58	44	45	36	38	40.75	5.00	0.91	2.3523	2.4090	1.024	1.92

<b>18</b>	K = 17.64 °R/in. Hg (English), 0.3858 %/mm Hg (Metric)
	T <sub>m</sub> = Absolute DGM avg. temperature (°R - English, °K - Metric)

<b>23</b>	K = 17.64 °R/in. Hg (English), 0.3858 %/mm Hg (Metric)
	T <sub>m</sub> = Absolute ambient temperature (°R - English, °K - Metric)

<b>16</b>	K = Average K factor from Critical Orifice Calibration
	K = DGM calibration factor

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:  
The following equations are used to calculate the standard volumes of air passed through the DGM, V<sub>m</sub>(std), and the critical orifice, V<sub>cr</sub>(std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

$$(1) \quad Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm} \quad = \text{Net volume of gas sample passed through DGM, corrected to standard conditions}$$

$$(2) \quad Vcr_{(std)} = K * \frac{Pbar * \Theta}{\sqrt{Tm}} \quad = \text{Volume of gas sample passed through the critical orifice, corrected to standard conditions}$$

T<sub>amb</sub> = Absolute ambient temperature (°R - English, °K - Metric)

K = Average K factor from Critical Orifice Calibration

$$(3) \quad Y = \frac{Vcr_{(std)}}{Vm_{(std)}} \quad = \text{DGM calibration factor}$$

40 CFR Part 60, Appendix A-1 Method 2 §10.3: Temperature Sensors. After each field use, calibrate thermocouples at a temperature within 10% of the average absolute stack temperature. A reference thermocouple and potentiometer (calibrated against NIST standards) may be used. The absolute temperature measured with the sensor being calibrated and the reference sensor must agree within 1.5%.

#### Thermocouple Calibration using NIST-Traceable PIE Model 520 Calibrator

Reference Value: 250  
Console Value: 250  
Percent Difference: 0.0%  
Acceptance Criteria: ±1.5%

#### Pre-calibration Procedure

- Check max vacuum (21-22 1/2 "Hg), leak check. Use WD-40 if necessary.
- Check pump oil level and pump knockout. Make sure there is extra pump oil.
- Check gauge oil on manometer. Add oil if necessary. Check for spare oil in back of meter.
- Wipe interior and exterior of meter clean with wet rag/soap.
- Check for missing or loose screws on meter box, pump housing and manometer.
- Proceed to meter and thermocouple calibration.
- Initial here upon completion \_\_\_\_\_

Practical Instrument Electronics  
Tel: (860) 872-2600 • Fax: (860) 872-2638

CERTIFICATE OF CALIBRATION  
This is to certify that your instrument has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology (NIST) within the limits of the NIST Calibration Services. Actual records pertaining to these standards are on file and are available for examination.

Certified By: Practical Instrument Electronics

Recommended Recalibration: Annually

Model Number: 520-K Serial No. SN 107078  
Calibration Date: 02-03-09 Calibration Technician S. Hall  
In Service Date: \_\_\_\_\_



EMISSIONS MEASUREMENT COMPANY



**MONTROSE**  
AIR QUALITY SERVICES

**METHOD 5 CRITICAL ORIFICE SET CALIBRATION**

ORIFICE SET	1230
ORIFICE SERIES	CO-1721S
METER GAMMA	0.9951

CALIBRATION CONDITIONS			
DATE STARTED	08/01/17		
DATE FINISHED	08/01/17		
CALIBRATION TECH	RS		

**CALIBRATION DATA**

Date	Orifice Number	Barometric Pressure	Theoretical Critical Vacuum	REFERENCE METER								RESULTS					
				DGM dH	Volume Initial	Volume Final	Total Volume	Standard Volume	Outlet Temp	Outlet Temp	Ambient Temp	Actual Vacuum	Ambient Temp	Actual Vacuum	Coefficient English	Coefficient Metric	% Variation From Average
08/01/17	12	mm Hg	mm Hg	min	V <sub>m0</sub>	V <sub>m0</sub>	V <sub>m0</sub>	V <sub>s0</sub>	t <sub>m0</sub>	t <sub>m0</sub>	t <sub>a0</sub>	t <sub>v0</sub>	t <sub>m0</sub>	K'	<0.5%	Q	
08/01/17	12	734	355.9	10	0.0	26.1846	26.2999	0.1154	0.1090	26.7	26.1	25.6	23.22743	590.0	2.5554E-04	0.3075	Lpm
08/01/17	12	734	355.9	10	0.0	26.2999	26.4452	0.1153	0.1091	26.1	26.1	25.6	23.22743	590.0	2.5563E-04	0.3076	10.86
08/01/17	12	734	355.9	10	0.0	26.4452	26.5305	0.1153	0.1091	26.1	26.1	25.6	23.22743	590.0	2.5569E-04	0.3075	10.86
08/01/17	17	734	355.9	10	0.0	26.5640	26.7297	0.1153	0.1058	26.1	26.1	25.6	21.8889	556.0	2.5560E-04	0.3075	10.86
08/01/17	17	734	355.9	10	0.0	26.7297	26.8855	0.1158	0.1059	26.1	26.1	25.6	21.8889	556.0	2.5561E-04	0.4421	0.01
08/01/17	17	734	355.9	10	0.0	26.8855	27.0613	0.1167	0.1056	26.1	26.7	25.6	21.8889	556.0	3.6766E-04	0.4424	0.08
08/01/17	19	734	355.9	10	0.0	27.0992	27.2850	0.1185	0.1754	26.7	26.7	25.6	21.8889	556.0	3.6707E-04	0.4416	-0.08
08/01/17	19	734	355.9	10	0.0	27.2850	27.4707	0.1185	0.1754	26.7	26.7	25.6	21.8889	556.0	3.6738E-04	0.4420	15.61
08/01/17	19	734	355.9	10	0.0	27.4707	27.6689	0.1186	0.1757	26.7	27.2	26.1	21.8889	556.0	3.6740E-04	0.4420	15.61
08/01/17	25	734	355.9	10	0.0	27.7420	27.9809	0.2389	0.2252	27.2	27.2	26.1	21.33774	542.0	4.1135E-04	0.4949	-0.07
08/01/17	25	734	355.9	10	0.0	27.9809	28.2199	0.2390	0.2251	27.2	27.8	25.6	21.33774	542.0	4.1140E-04	0.4950	-0.05
08/01/17	25	734	355.9	10	0.0	28.2199	28.4595	0.2396	0.2253	27.8	28.3	26.1	21.33774	542.0	4.1210E-04	0.4958	0.12
08/01/17	30	734	355.9	10	0.0	0.3143	0.6042	0.2859	0.2722	28.3	28.3	26.1	19.95984	507.0	4.1162E-04	0.4952	17.49
08/01/17	30	734	355.9	10	0.0	0.6042	0.8944	0.2902	0.2723	28.3	28.9	26.1	18.66068	474.0	6.3857E-04	0.7683	-0.09
08/01/17	30	734	355.9	10	0.0	0.8944	1.1855	0.2911	0.2728	28.9	28.9	26.1	18.66068	474.0	6.3879E-04	0.7686	-0.05
08/01/17	30	734	355.9	10	0.0	1.1855	1.4766	0.2911	0.2728	28.9	28.9	26.1	18.66068	474.0	6.4001E-04	0.7700	27.16
08/01/17	30	734	355.9	10	0.0	1.4766	1.7677	0.2911	0.2728	28.9	28.9	26.1	18.66068	474.0	6.3912E-04	0.7690	27.12

I certify that the above Orifice Set was calibrated in accordance with US EPA Methods, CFR 40 Part 60, Appendix A, Method 5, Section 16.2.

  
Approved By: \_\_\_\_\_

Date: 8/1/2017

For valid test results, the Actual Vacuum must be 25mHg greater than the Theoretical Critical Vacuum.  
The Critical Orifice Coefficient, K1 in Metric units, ( $m^3 \cdot K^{-1} \cdot (mmHg)^{-1} \cdot min$ )

R.F. DGM - OXO

**APEX INSTRUMENTS REFERENCE METER 2 Point Audit  
USING WET-TEST METER #11AE6  
Air Compliance Testing**

Calibration Meter Information			
WTM Model #	AL20		
WTM Serial #	11AE6		
WTM Gamma	0.9899		
Original 1EPT Gamma	0.9951		

Calibration Conditions			
Date	Time	12-Jan-17	1:30
Barometric Pressure	29.85	in Hg	
Calibration Tech	EW		
DGM Serial Number	S-110-1512377		

Run Time	DGM Input Pressure ( $P_{in}$ ) in H <sub>2</sub> O	Volume Initial ( $V_{in}$ ) cubic feet	Volume Sample ( $V_{in}$ ) cubic feet	Calibration Data				Calibration Meter Initial ( $t_{in}$ ) °F	Volume Final ( $V_{in}$ ) cubic feet	Volume Sample ( $V_{in}$ ) cubic feet	Outlet Temp ( $t_{out}$ ) °F	Water Pressure ( $P_{in}$ ) in H <sub>2</sub> O	Water Pressure ( $P_{in}$ ) in H <sub>2</sub> O	Calibration Factor Current (Y)	Dry Gas Meter Calibration Factor Previous (Y)	Dry Gas Meter Current (Y)
				Initial ( $t_{in}$ ) °F	Final ( $t_{in}$ ) °F	Initial ( $V_{in}$ ) cubic feet	Final ( $V_{in}$ ) cubic feet									
6.00	-3.9	435.192	441.194	6,002	73.4	672.645	678.575	5.930	70	70	2.2	0.9927	0.9985			
10.00	-2.2	441.194	446.788	5,594	73.4	678.575	684.115	5.540	70	70	1.8	0.9983	0.9977	0.59%	must be less than	

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, App A, Method 5, Paragraph 7.1.2.2, using the Precision Wet Test Meter # 11AE6, which in turn was calibrated using the American Bell Prover # 3785, certificate # F107, which is traceable to the National Bureau of Standards (N.I.S.T.).

Signature *Chris White*

Date

1/12/17

PF-DGM-DOLO

**APEX INSTRUMENTS REFERENCE METER CALIBRATION  
USING WET-TEST METER #1AE6**

**15-POINT ENGLISH UNITS**

Calibration Meter Information			
WTM Model #	AL-20	Date	7-Feb-14
WTM Serial #	11AE6	Barometric Pressure	29.9 in Hg
WTM Gamma	0.9999	Calibration Technician	EW
DGM Serial Number			S-120-1512377

Run Time	Calibration Data										Results					
	Dry Gas Meter			Calibration Meter			Dry Gas Meter			Calibration Factor			Flowmeter			
Elapsed (h)	Meter Pressure (Pa)	Volume Initial (V <sub>1</sub> )	Volume Final (V <sub>2</sub> )	Outlet Temp Initial (T <sub>1</sub> )	Outlet Temp Final (T <sub>2</sub> )	Volume Initial (V <sub>1</sub> )	Volume Final (V <sub>2</sub> )	Sample Volume (V <sub>s</sub> )	Outlet Temp Initial (T <sub>1</sub> )	Outlet Temp Final (T <sub>2</sub> )	Calibration Factor (Y)	Value (A)	Variation (%)	Std & Port cm <sup>3</sup>		
5	-5.0	206.288	212.428	6140	73.4	73.4	78.120	85.150	6.030	69	69	1.0025	0.0032	1.20		
5	-5.0	212.428	218.584	6166	73.4	73.4	85.150	91.175	6.025	69	69	0.9974	-0.0019	1.20		
5	-5.0	218.584	224.757	6163	73.4	75.2	91.175	97.190	6.015	69	69	0.9979	-0.0013	1.20		
6	-3.8	243.237	249.255	6028	75.2	75.2	115.300	121.165	5.865	69	69	0.9935	0.0008	0.97		
6	-3.8	249.265	255.316	6051	75.2	75.2	121.165	127.045	5.880	69	69	0.9923	-0.0004	0.98		
6	-3.8	255.316	261.372	6056	75.2	75.2	127.045	132.930	5.885	69	69	0.9923	-0.0004	0.98		
7	-2.9	261.372	267.016	5644	75.2	75.2	132.930	138.420	5.490	69	69	0.9911	-0.0013	0.78		
7	-2.9	267.016	272.644	5628	75.2	75.2	138.420	143.900	5.480	69	69	0.9921	-0.0003	0.78		
7	-2.9	272.644	278.281	5637	75.2	77.0	143.900	149.390	5.490	69	69	0.9940	0.0016	0.78		
10	-2.2	278.281	283.943	5662	77.0	77.0	149.390	154.925	5.535	69	69	0.9977	0.0023	0.55		
10	-2.2	283.943	289.608	5665	77.0	77.0	154.925	160.450	5.525	69	69	0.9953	0.0000	0.55		
10	-2.2	289.608	295.281	5673	77.0	77.0	160.450	165.970	5.520	69	69	0.9930	-0.0023	0.55		
15	-1.9	224.757	230.823	6166	75.2	75.2	97.190	103.240	6.050	69	69	0.9972	0.0012	0.40		
15	-1.9	230.923	237.078	6155	75.2	75.2	103.240	109.270	6.030	69	69	0.9957	-0.0003	0.40		
15	-1.8	237.078	243.237	6159	75.2	75.2	109.270	115.300	6.030	69	69	0.9951	-0.0009	0.40		
												0.9980	Averages	0.40		
												0.99851	Overall Average Y	0.99851		

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +/- 0.02.

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, Using the Precision Wet Test Meter # 11AE6, which in turn was calibrated using the Anemand Bar Prover # 3785, certificate # F107, which is traceable to the National Bureau of Standards (N.I.S.T.).

*John G. Lefebvre*  
Signature

Date

2/12/14

**RE: Certification of Air Emission Testing Body (AETB) Conformance**

To Whom it May Concern:

This letter is to confirm that Emissions Measurement Company LLC ("EMCo") is an Air Emission Testing Body (AETB) operating in conformance with ASTM D7036-04, as required by 40 CFR Part 75, Appendix A §6.1.2. The table below lists the EPA Reference Methods for which each listed Project Manager is a Qualified Individual and other relevant information required by (as applicable) 40 CFR Part 75.59(a)(15), 40 CFR Part 75.59(b)(6) and 40 CFR Part 75.59(d)(4).

<b>Emissions Measurement Company (800) 984-9883 AETB Qualified Individual Information</b>					
QI Name	QI Email	Exam*	Exam Date	Exam Provider	Provider Email
<b>Andrew Bruning</b>	abruning@stacktest.us	SES Group 1	6/12/2014	SES	QSTIprogram@gmail.com
		SES Group 2	9/18/2015		
		SES Group 3	6/12/2015		
<b>Craig Kormylo</b>	ckormylo@stacktest.us	EPA Method 30B	1/16/2015*	Ohio-Lumex	andrew.mertz@ohiolumex.com
		SES Group 1	2/5/2016	SES	QSTIprogram@gmail.com
		SES Group 3	1/16/2015*	Ohio-Lumex	andrew.mertz@ohiolumex.com
<b>Matthew Parks</b>	mparks@stacktest.us	SES Group 1	2/5/2016	SES	QSTIprogram@gmail.com
		SES Group 2	9/18/2015		
		SES Group 3	2/5/2016		
<b>Scott Bouchard</b>	sbouchard@montrose-env.com	SES Group 1	4/7/2017	SES	QSTIprogram@gmail.com
		SES Group 3	8/11/2017		

\*The Source Evaluation Society (SES) Group 1 Exam includes EPA Reference Methods 1, 1A, 2, 2A, 2C, 2D, 2F, 2G, 2H, 3, 3B, 4, 5, 5A, 5B, 5D, 5E, 5F, 5I, 17, 19, 201A and 202. The SES Group 2 Exam includes EPA Reference Methods 1 , 2, 3, 4, 3B, 6, 6A, 6B, 7, 7C, 7D, 8, 11,13A, 13B, 15A, 16A, 19, 26, 26A and 202. The SES Group 3 Exam includes EPA Reference Methods 3A, 6C, 7E, 10, 10B, 20, 25A, 40 CFR Part 60 Performance Specifications 2 – 8, 15 and 40 CFR Part 75. Initial 30B training provided by Ohio-Lumex; refresher exam administered by EMCo once every five years.

Please feel free to contact me with any questions regarding the above.

  
Matthew Parks  
Technical Director